

REMARKS/ARGUMENTS

Reconsideration of this application is requested. Claims 41 to 67 and 76 are under active examination.

Amended claims

Claim 41 has been amended to clarify that in step (ii) of the claimed process involves “*introducing the treatment fluid into said underground formation containing said filter cake*”. The process of the present invention is therefore directed to disrupting filter cake in an underground formation by introducing a treatment fluid to into the filter-cake-containing formation. The treatment fluid thus disrupts a pre-existing filter cake by an exogenous breaking action of the solid polymer present in a treatment fluid.

It is quite clear from the description as a whole that the process of the invention is directed to disrupting pre-existing filter cakes. Furthermore, specific support for the amendment to claim 41 can be found, for example, at page 5, lines 5 to 6 (referring to “*disrupting a filter cake present in an underground formation*” and at page 6, lines 1 to 2 (which indicates that the “*underground formation to be treated*” is “*lined with a filter cake*”).

Priority

1. Applicant gratefully notes that Examiner has acknowledged receipt of papers submitted under 35 USC 119(a)-(d) and indicated that said papers have been placed of record on the file.

Claim Rejections under 35 USC § 102

2&3. Examiner has rejected claims 41-51, 59-64 and 76 as being unpatentable over Willberg *et al.*

In response, it is noted that Willberg *et al* relates to compositions and methods for generating self-destructing filter cakes in wellbores and in subterranean formations (column 1, lines 11 to 13). The composition comprises a mixture of a “solid acid-precursor” and a “solid acid-reactive material” (column 1, line 64 to column 2, line 7). This mixture is capable of forming a filter cake for use in oilfield applications. The solid acid-precursor then hydrolyses in the presence of water to produce an acid, which dissolves the acid-reactive material to destroy (“self destruct”) some or all of the filter cake.

Accordingly, the composition of Willberg *et al* is itself a filter cake. The purpose of this filter cake is clearly described at column 1, lines 18 to 29. In particular, the filter cake is desirable in certain oilfield operations, for example to prevent fluid leakage during a well treatment, but then after that treatment becomes “undesirable or unacceptable” (see column 1, lines 28 to 29). Thus, the filter cake provided by Willberg *et al* is designed, as described above, to self-destruct over time.

Furthermore, the composition as defined in Willberg *et al*, for example in claim 1, would not be suitable for exogenously disrupting a pre-existing filter cake in an underground formation. The reason is that the acid produced by hydrolysis of the “solid acid-precursor” according to Willberg *et al* is spent on the “solid acid-reactive material” (i.e., the other essential feature of the invention), as it is produced. The composition consequently self-destructs, but does not substantially disrupt a filter-cake other than the composition itself. In this respect, the acid according to Willberg *et al*. acts as an internal breaker.

Applicant has carefully noted Examiner’s explanation at paragraph 8 as to why the arguments filed by Applicant on August 18, 2008 in relation to patentability over Willberg *et al* were not considered persuasive. In particular, Applicant has noted Examiner’s comment that

“...it is noted that the features upon which Applicant relies (i.e. a pre-existing filter cake and the exogeneous breaking action of the solid polymer in the treatment fluid) are not recited in the rejected claim(s).”

In response, Applicant has amended claim 41 to clarify that in step (ii) of the claimed process, the treatment fluid is introduced into “said underground formation containing said filter cake”. Thus, the feature of disrupting a pre-existing filter cake, by introduction of an exogenous disrupting agent (i.e., the treatment fluid), is now clearly recited in claim 41. This feature is not disclosed in Willberg *et al* because, as explained above, that document teaches a filter cake that is created when the treatment fluid is introduced and then internally self-destructs over time. Furthermore, the compositions of Willberg *et al* would be ineffective in disrupting a pre-existing filter cake. The process claimed in the present application is therefore not anticipated by Willberg *et al*.

Still further, for the avoidance of doubt it is noted that the treatment fluid specified in the present claims would itself not form any filter cake when introduced to an underground

formation already containing a filter cake. In order to form a filter cake on a surface, it is necessary that fluid leak-off can occur. This is the situation when, for example, drilling into a formation. As fluid loss takes place and a filter cake is formed, the rate of fluid leak-off falls to a level where no further deposition of material in the filter cake is possible. This means that where no filter cake already exists and leak-off can occur, it is possible to deposit a filter cake containing solid acid-precursor, for example according to the methods of *Willberg et al.* However, it also means that where there is a pre-existing filter cake, it is not possible for a treatment fluid containing a solid acid-precursor to deliver additional solid acid-precursor into the pre-existing filter cake, or to deposit an additional filter cake on top of the pre-existing filter cake. This provides a further illustration of the important differences between the process of the present invention and the methods described in *Willberg et al.*

Claims 42-51, 59-64 and 76 depend on claim 41 and thus derive their patentability from that claim. Accordingly, for the reasons discussed above in relation to claim 41, Applicant submits that the subject-matter of these dependent is also not anticipated by *Willberg et al.* It is therefore submitted that the rejections under this heading should be withdrawn.

Claim Rejections under 35 USC § 103

4&5. The Examiner has rejected claims 52-58 and 65-67 under this heading for being unpatentable over *Willberg et al* as applied to claim 41 above, and further in view of *Harris et al.*

In response, Applicant submits that the subject-matter of independent claim 41 as amended, which has been shown in the foregoing paragraphs 2&3 to be novel over *Willberg et al*, is also non-obvious over *Willberg et al* in view of *Harris et al.*

With reference to independent claim 41, *Willberg et al* provides no suggestion at all of a process for disrupting pre-existing filter cake in an underground formation. Rather, it outlines a process for forming or adding a filter cake, which then self-destructs *in situ*. Still less does *Willberg et al* suggest a process that involves incorporating a solid polymer of the present invention into a treatment fluid, which is capable of exogenously disrupting a filter cake present in an underground formation. The skilled person would not therefore consider this document to be relevant to the task of providing a process for exogenously disrupting a filter cake using a treatment fluid.

Harris *et al* fails to remedy the deficiencies in the teaching of Willberg *et al*. Like Willberg *et al*, the document does not disclose or suggest the process defined in claim 41. In particular, Harris *et al* teaches a method for treating an underground reservoir by introducing a treatment liquid comprising an ester and a non-enzyme catalyst capable of increasing the rate of hydrolysis of the ester. Hydrolysis of this ester produces an organic acid to dissolve acid soluble material present within the reservoir. The esters disclosed in Harris *et al* are liquids (see, for example, the specific esters listed on page 4, lines 17 to 23 and in claim 11), whereas the polymers used in the present invention are solids. In addition, Harris *et al* teaches that the specific combination of a liquid carboxylic acid ester such as a methanoic or ethanoic acid ester and a non-enzyme catalyst is necessary in order to achieve acid production at a sufficiently high rate to disrupt a filter cake. It is therefore surprising in view of Harris *et al* that simply by adding a solid polymer of the invention to a treatment fluid one can arrive at a process that successfully disrupts a pre-existing filter cake in an underground formation.

A person of ordinary skill in the art would not therefore have been able to derive the present invention from Harris *et al*. He or she would also not have considered combining the teaching of Harris *et al* and Willberg *et al* in any way. This is because Harris *et al* is concerned with removing acid soluble material already present in an underground reservoir, whereas Willberg *et al* teaches methods for depositing such acid soluble material into a filter cake, which then self-destructs over time. Thus, a skilled person would certainly not have been able to derive the process of present claim 41 from either Willberg *et al* or Harris *et al* alone, or by an obvious combination of these two documents. Applicant therefore submits that the subject-matter of claim 41 is non-obvious over Harris *et al* and Willberg *et al*.

Dependent claims 52-58 and 65-67 depend on claim 41 and therefore derive their patentability from it. Accordingly, Applicant submits that the subject-matter of these claims must also be non-obvious over Willberg *et al* in view of Harris *et al*. It is therefore believed that the rejection over this combination of documents can be withdrawn.

6. The Examiner has further rejected claim 67 as being unpatentable over Willberg *et al* as applied to claim 41 above and in view of Constien *et al*.

In response, Applicant submits that the subject-matter of claim 41 is non-obvious over Willberg *et al* in view of Constien *et al*. The discussion in the foregoing paragraphs 4&5 establishes that the claimed subject-matter is non-obvious over Willberg *et al*.

Like Harris *et al*, also discussed in paragraphs 4&5, Constien *et al* fails to remedy the deficiencies in the teaching of Willberg *et al*. Constien *et al* does not disclose or suggest the process defined in claim 41. In particular, Constien *et al* teaches protective screen coatings comprising a binder that contains a "reactive material". The reactive material can be any of a very wide range of materials, including enzymes, chelants, acids, surfactants, oxidisers or free radical generators, corrosion inhibitors, scale or paraffin inhibitors or "other specific chemicals as called for by a particular well condition" (column 6, lines 39 to 43). After placement of the screen, the binder dissolves or melts and thus releases the reactive material. There is no reference in Constien *et al* to use of a treatment fluid of any sort, and still less of such a fluid in which a solid polymer has been incorporated. Thus, Constien *et al* indicates that a solid polymer, if it is to be used at all, should be incorporated into a binder forming a solid coating on a screen.

In view of the above it will be clear that neither Willberg *et al* nor Constien *et al* suggests a process for exogenously disrupting filter cake with a solid polymer incorporated into a treatment fluid. The skilled person would not therefore have been able to derive the process of claim 41 from a combination of the teaching of Willberg *et al* with that of Constien *et al*. Applicant therefore submits that the subject-matter of claim 41 is non-obvious over these documents.


Claim 67 depends on claim 41 and thus derives its patentability from that claim. Accordingly, for the reasons discussed above in relation to claim 41, Applicant submits that the subject-matter of claim 67 is also non-obvious over Willberg *et al* and Constien *et al*. It is therefore believed that the rejection over this combination of documents can be withdrawn.

Favorable reconsideration and withdrawal of the outstanding objections and rejections is believed to be in order and is respectfully requested.

HARRIS et al.
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Respectfully submitted,

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